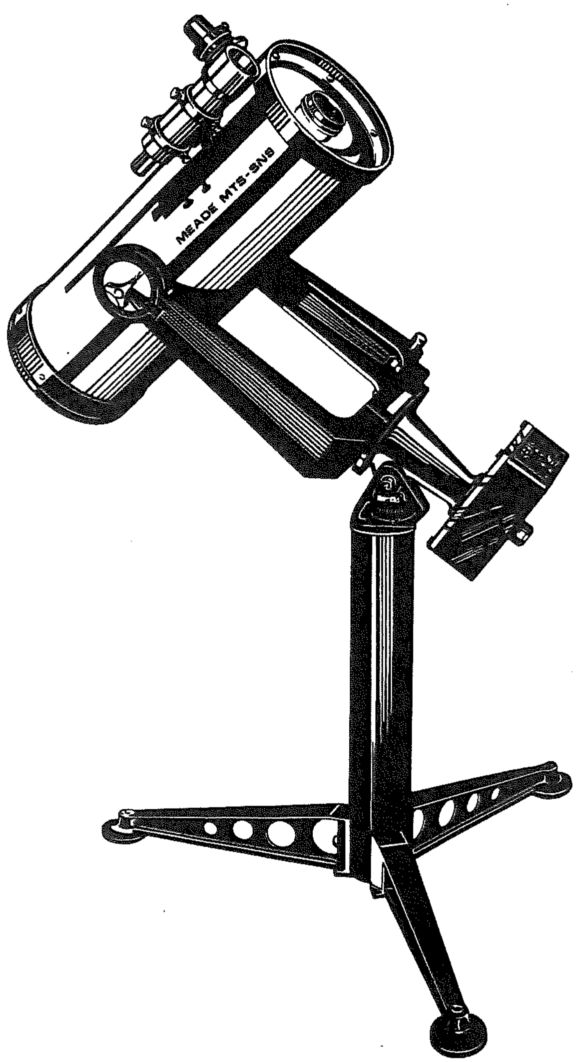
OPERATING INSTRUCTIONS

MEADE MODELS MTS-SN6 6" f/5
AND MTS-SN8 8" f/4
SCHMIDT-NEWTONIAN TELESCOPES



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WARNING!

NEVER ATTEMPT TO OBSERVE THE <u>SUN</u> THROUGH YOUR MEADE TELESCOPE! OBSERVING THE SUN, EVEN FOR THE SHORTEST FRACTION OF A SECOND, WILL CAUSE INSTANT AND IRREVERSIBLE EYE DAMAGE. WHEN OBSERVING DURING THE DAYTIME, DO NOT POINT THE TELESCOPE EVEN CLOSE TO THE SUN.

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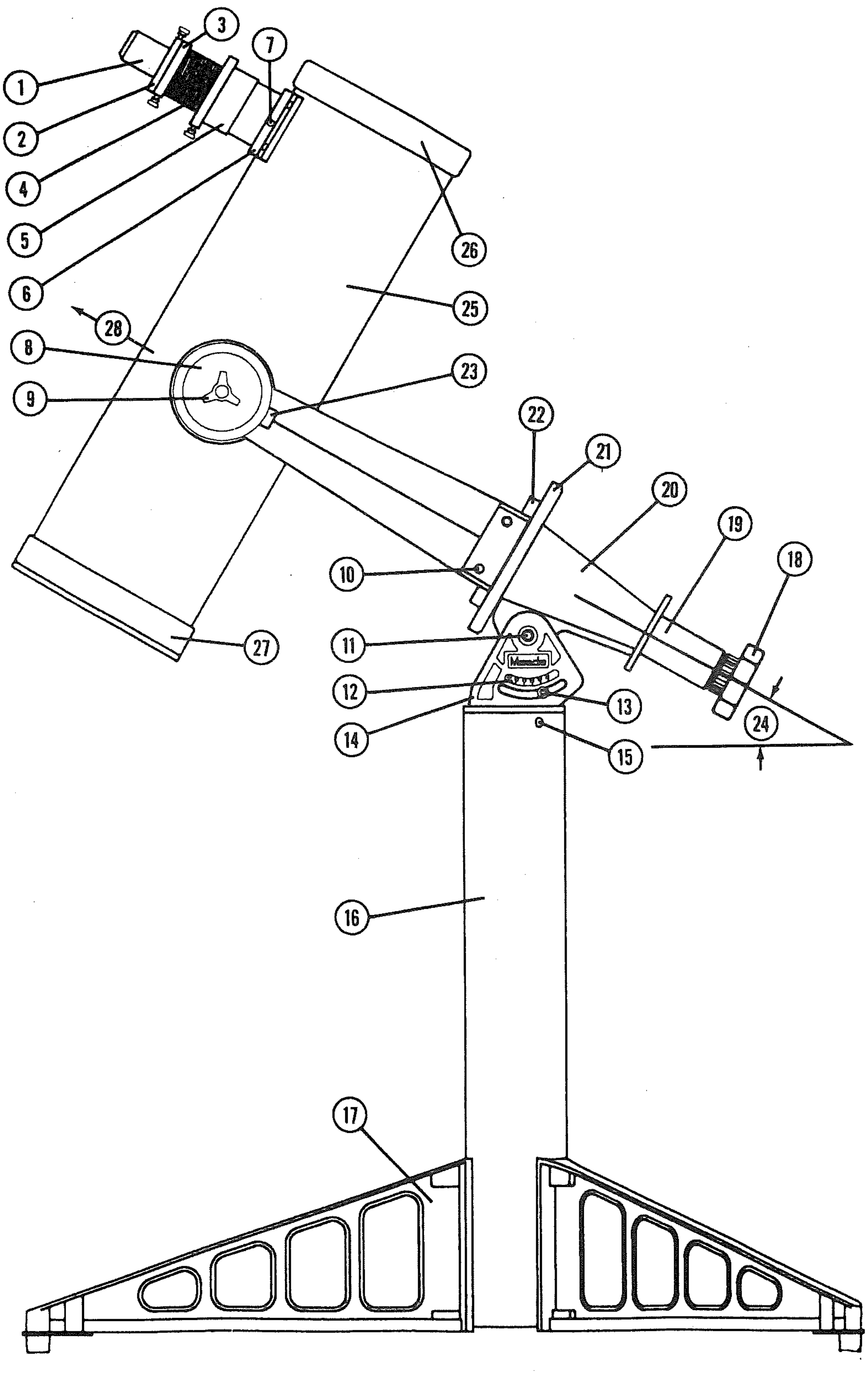

Fig. 1

Key to Fig. 1

1. Eyepiece
2. 1-1/4" Adapter
3. Focuser threaded tube
4. Focuser quick focus threads
5. Focuser slide tube
6. Focuser base
7. Focuser slide tube lock thumbscrew
8. Dec. clutch plate
9. Dec. lock knob
10. Fork arm attachment bolt
11. Latitude pivot bolt
12. Latitude scale
13. Latitude locking bolt
14. Pier cap
15. Pier cap attachment bolt
16. Pier
17. Tripod leg
18. R.A. lock knob
19. R.A. drive spacer
20. Polar housing
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A. INTRODUCTION

The Meade MTS-SN6 and MTS-SN8 Schmidt-Newtonian Telescopes permit a very wide range of serious astronomical applications. These photographically fast, large aperture reflectors will reveal astronomical objects which cannot be seen with smaller instruments.

This manual details the set-up, operation, and specifications of your Meade MTS Series Schmidt-Newtonian Telescope.

B. STANDARD EQUIPMENT LIST

Model MTS-SN6 Schmidt-Newtonian

* Complete 6" f/5 optical tube assembly with dust cover
* MA 25mm eyepiece (30X) (1-1/4" O.D.)
* Helicoid photo/visual focuser for 1-1/4" or 2" eyepieces
* Complete equatorial fork mounting with latitude scale
* Steel pier (4" x 24" long)
* 3 Tripod legs
* Required hex wrenches for assembly
* Instruction manual

Model MTS-SN8 Schmidt-Newtonian

* Complete 8" f/4 optical tube assembly with dust cover
* MA 25mm eyepiece (33X) (1-1/4" O.D.)
* Helicoid photo/visual focuser for 1-1/4" or 2" eyepieces
* Complete equatorial fork mounting with latitude scale
* Steel pier (4" x 24" long)
* 3 Tripod legs
* Required hex wrenches for assembly
* Instruction manual

C. UNPACKING

The MTS-SN6 telescope has been carefully packed in two cartons as follows:

Carton #1:

* The complete optical tube with equatorial fork mount and pier cap with latitude scale
* Instructions

Carton #2:

* MA 25mm eyepiece
* Steel pier
* 3 tripod legs
* Helical focuser
* Hex wrenches

The MTS-SN8 telescope has been carefully packed in two cartons as follows:

Carton #1:

* The complete optical tube with fork arms
* Instructions

Carton #2:

* Equatorial mount and pier cap with latitude scale
* MA 25mm eyepiece
* Steel pier
* 3 tripod legs
* Helical focuser
* Hex wrenches

Please remove and identify each part from the cartons using the list on page 5. Save all original packing materials; if it is ever necessary to ship the telescope, these materials will help to assure that no shipping damage will occur.

D. ASSEMBLY

Please refer to Fig. 1.

1. Attach the 3 tripod legs (#17, Fig.1) to the pier (#16, Fig. 1) using the 3/8" washers and 3/8" wing nuts provided. Set the assembled pier and tripod legs on the floor.

If you are assembling a MTS-SN6, go to step 6, below. The 8" Schmidt-Newtonian telescope is shipped with the fork arms separated from the main mount.

2. Place the optical tube flat on a carpeted floor.

3. Remove the threaded metal rod that has been used to tie the fork arms together for safety in shipment (this rod may be set aside for re-use in case of future shipment).

4. Remove the 4 fork arm attachment bolts (#10, Fig. 1) from the flat sides of the main mount (2 on each side).

5. Position the two fork arms on each side of the main mount and thread in the 4 bolts. When the 4 bolts are "snug", adjust the fork arms so that they are straight with the main mount. Then tighten the 4 bolts firmly.

Note: once attached, the fork arms may be left permanently attached to the telescope. (Exception: if the telescope is ever reshipped by a commercial freight carrier, the fork arms should be removed and the telescope packed exactly as you have received it.)

6. Pick up the telescope and position the pier cap (#14, Fig. 1) into the top of the pier. Lock the pier cap into place by using the 3 - 1/4-20 button-head cap screws. Tighten the 3 screws to a firm feel.

7. Three pieces of the focuser are packed separately to prevent damage. Slide the focuser assembly into the focuser base (#6, Fig. 1) located on the main optical tube assembly. (See "Helical Focuser", below.)

E. TELESCOPE SET-UP

1. Setting the Latitude

Before using the telescope, you need to adjust the tilt of the equatorial mount to match your observing location, so that the telescope will move correctly (see the discussion on "Understanding Celestial Movement" and "Polar Alignment of the Equatorial Mount", below).

1. You will first need to determine the correct latitude for your location. Most automobile maps and atlases will show the lines of latitude. The continental United States ranges from about 25° at the tip of Florida to 48° along the Canadian boarder.

Honeywood - 44.5° N

2. CAUTION! Before proceeding with the next step, support the weight of the telescope. When you loosen the following bolts the telescope will fall to the lowest position if not supported, possibly resulting in damage to the telescope.

Loosen the latitude pivot bolt (#11, Fig. 1) slightly, and the latitude locking bolts (#13, Fig. 1) on both sides of the Pier cap (#14, Fig. 1) slightly.

3. Using the center of the bolt as a pointer, set the angle of the mount to your latitude.

4. Tighten all three bolts firmly.

2. Manual Lock Knobs

The telescope is supplied with locking knobs which serve two functions. First, they provide friction to the mount so that the telescope does not move too freely, and second, they allow the observer to "lock" the telescope at a given position.

The R.A. lock knob (#18, Fig. 1) is seldom used to "lock" the telescope completely, since you will move the telescope in Right Ascension (R.A.) to manually "track" celestial objects. Use the R.A. lock knob to put a comfortable "drag" on the telescope motion. The telescope should move easily, but stop completely when not being pushed.

The Declination (Dec.) lock knobs (#9, Fig. 1) are also used to provide a comfortable drag on telescope movement. Once an object is located in the telescope's field of view, you may wish to "lock" the Declination, so that it does not move accidentally as you move the telescope in R.A. (for tracking). There are two of these Dec. lock knobs, and either or both may be used.

When using either the R.A. or Dec. lock knobs, do not force telescope movement. If one or both lock knobs are "locked", release them before moving the telescope.

3. Helical Focuser

The helical focuser supplied with the MTS telescopes differs from most telescope focusers in that it has a "quick focus" feature. When changing eyepieces or accessories such as cameras or barlow lenses, it is often necessary for large changes in focus. By pushing or pulling on the focuser threaded tube (#3, Fig. 1) it will "snap" to the new approximate location. Then, by rotating the threaded tube, critical focus is achieved.

When using eyepieces, the focuser slide tube (#5, Fig. 1) should be positioned into the focuser base (#6, Fig. 1) about 3/8" and locked into place using the locking thumbscrew (#7, Fig. 1). When doing some forms of astrophotography, the focuser slide tube will need to be moved to its lowest position (see "Astrophotography", below).

F. TELESCOPE OPERATION

1. Celestial Coordinates: Declination and Right Ascension

Analogous to the Earth-based coordinate system of latitude and longitude, celestial objects are mapped according to a coordinate system on the "celestial sphere", the imaginary sphere on which all stars appear to be placed. The Poles of the celestial coordinate system are defined as those two points where the Earth's rotational axis, if extended to infinity, North and South, intersects the celestial sphere. In fact, this point in the sky is located near the North Star, or Polaris.

On the surface of the Earth, "lines of longitude" are drawn between the North and South Poles. Similarly, "lines of latitude" are drawn in an East-West direction, parallel to the Earth's equator. The celestial equator is simply an extension of the Earth's equator onto the celestial sphere. Just as on the surface of the Earth, imaginary lines have been drawn on the celestial sphere to form a coordinate grid. Celestial object positions are mapped on this grid, in the same manner as positions on the Earth's surface are specified by their latitude and longitude.

The celestial equivalent to Earth's latitude is called "Declination", and it is measured in degrees, minutes, and seconds north ("+") or south ("-") of the celestial equator. Thus any point on the celestial equator (which passed, for example, through the constellations Orion, Virgo, and Aquarius) is specified as having 0°0'0" Declination. The Declination of the star Polaris, located very near the North Celestial Pole, is +89.2 °.

The celestial equivalent to Earth's longitude is called "Right Ascension", or "R.A.", and it is measured in hours, minutes, and seconds from an arbitrarily defined "zero" line of R.A. passing through the constellation Pegasus. Right Ascension coordinates range from 0hr 0min 0sec up to (but not including) 24 hr 0min 0sec. Thus there are 24 primary lines of R.A., located at 15° intervals along the celestial equator. Objects located further east of the prime (0h0m0s) Right Ascension grid line carry increasing R.A. coordinates.

With all celestial objects therefore capable of being specified in position by their celestial coordinates of Right Ascension and Declination, the task of finding objects (in particular, faint objects) in the telescope is vastly simplified. The optional setting circles may be dialed, in effect, to read the object coordinates and the desired object can be found without resorting to visual techniques. However, these setting circles may be used to advantage only if the telescope is first properly aligned to the North Celestial Pole. (See "Polar Alignment of the Equatorial Mount", below.)

2. Understanding Celestial Movement

Celestial bodies move from east to west in a curved path through the night skies. The path they follow is known as their line of Right-Ascension. This apparent motion is caused by the Earth's rotation. In order to observe a celestial body continuously for more than a few minutes without its drifting out of the telescope's field of view, the position of the telescope must be constantly adjusted to compensate for the Earth's axial rotation.

The function of the telescope's equatorial mount is to line up the telescope's polar axis with the North Celestial Pole. In this way astronomical objects may be followed, or tracked, simply by moving the telescope about a single axis, the polar axis. (This may be accomplished automatically with the optional #788 Electric Drive or #790 LX3 Quartz Motor Drive System.)

While the above "theory" of the equatorial mount may seem somewhat complex to the first-time user of an equatorial mount, in fact this type of mount is easy to set up and use: after one observing session through the telescope, you will probably never want again to use an astronomical telescope not equipped with an equatorial mount as it so greatly facilitates the tracking of astronomical objects.

3. POLAR ALIGNMENT OF THE EQUATORIAL MOUNT

a. Rough Polar Alignment

Your telesope is equipped with an equatorial mount which, when properly aligned, will turn the optical tube precisely to counteract the constant rotation of the Earth. The telescope's polar axis must point to the Celestial Pole - the imaginary point around which all stars appear to rotate. Polaris, the North Star, is conveniently located about 1° from the true North Celestial Pole. When properly aligned, any celestial object will be centered in the telescope's field of view by simply moving the instrument in its Right Ascension axis. With the motor drive attached, the telescope will automatically turn at the correct speed.

For casual observing, the following 2-step alignment procedure is satisfactory:

1. One of the 3 tripod legs is designated the "North Leg" and is easily identified as the leg that is parallel to the Polar casting, when viewed from above (#17, Fig. 1). Set the mount on level ground with this leg pointing North.

2. Check the latitude scale to confirm that the polar axis is tilted to equal the latitude of your viewing location. (Most automobile maps show latitude lines.)

The above method is adequate for casual observing. However, if you wish to take astrophotographs, the polar axis must be more accurately aligned.

b. Precise Polar Alignment

Precision polar alignment is accomplished using a relatively simple technique known as "Declination-drift." (This procedure requires a motor drive.) In addition to the tools supplied with the telescope, you will need a small carpenter's level and a cross-hair eyepiece. To precisely polar align your telescope:

1. "Rough-align" the mount using the 2-step procedure outlined above.

2. Place a carpenter's level on the flat section of the pier cap, and level the mount as needed.

3. Insert the cross-hair eyepiece into the focuser and point the telescope at a bright star near the Meridian (the North-South line passing through your local zenith) and within 10° of the Celestial equator.

4. With the motor drive running, observe which direction the star drifts in declination (North-South). Remember: your telescope inverts the image, so North is *down* when viewed through the telescope. Disregard any apparent drift in Right Ascension (East-West).

5. If the star drifts *northward*, the polar axis is pointing too far to the *west* of the true Celestial Pole. If it drifts *southward*, the polar axis is too far *east*. Rotate the mount in azimuth as appropriate to eliminate the Declination drift.

6. Point the telescope to another bright equatorial star, this time near the eastern horizon. This star should lie 20° to 30° above the horizon and within 5° of the Celestial equator.

7. Again, note the extent of the star's drift in Declination. If the star drifts *northward*, the polar axis is pointing too *high*. If it drifts *southward*, the polar axis is pointing too *low*. Without disrupting the horizontal alignment, adjust the latitude setting appropriately. Repeat until no drift in Declination is detected.

8. When a star can be kept in the field of view indefinitely, the mount is precisely polar aligned.

4. Using The Telescope

a. First Observations

With the telescope aligned to the Pole, you are now ready to begin observations.

1. First, decide on an easy-to-find object; the Moon, if visible, is a good candidate, or a bright star. Insert the MA 25mm eyepiece into the helicoid focuser of the telescope.

2. Loosen the telescope's R.A. Lock (#18, Fig. 1) and Declination lock (#9, Fig. 1). The telescope can now move freely on its 2 axes.

3. Using the side of the telescope tube, sight-in on the object you have chosen; re-tighten the R.A. and Declination locks.

4. The object should now be in the main telescope's field of view. Focus the image by rotating the focuser tube.

5. Notice that the object immediately starts to drift out of the field of view; this motion is caused by the Earth's rotation. To "track" the object, and keep it in the field of view, slowly turn the telescope in Right Ascension.

6. For more detailed examination, switch to a higher power eyepiece (if available), after the image has been located and focused with the lower power eyepiece.

b. Observing Tips

1. Avoid touching the eyepiece while actually observing through the instrument. Vibrations resulting from such contact will cause the image to move.

2. Allow a few minutes for your eyes to become "dark-adapted" prior to attempting any serious observations.

3. Do not set up the telescope inside a room and observe through an open window (or even worse, a closed window). Images viewed in such a manner may appear blurred or distorted, due to temperature differences between inside and outside air.

4. Always begin observation of a new object with the lowest power eyepiece. Lower-power eyepieces generally yield sharper, brighter images, especially when adverse "seeing" conditions prevail.

5. NEVER ATTEMPT TO OBSERVE THE SUN THROUGH YOUR MEADE TELESCOPE! OBSERVING THE SUN, EVEN FOR THE SHORTEST FRACTION OF A SECOND, WILL CAUSE INSTANT AND IRREVERSIBLE EYE DAMAGE. WHEN OBSERVING DURING THE DAYTIME, DO NOT POINT THE TELESCOPE EVEN CLOSE TO THE SUN.

c. Applications of the Telescope

The Meade MTS Series telescopes may be used for a lifetime of rewarding astronomical observing, but basic to your enjoyment of the telescope is a good understanding of the instrument. Read the above instructions carefully until you have an understanding of all the telescope parts and functions. One or two observing sessions will serve to clarify these points forever in your mind.

The number of fascinating objects visible through your Meade Schmidt-Newtonian is limited only by your own motivation. Obtain a good star atlas and read the listings of objects visible through 6" or 8" telescopes. These objects include:

* Cloud belts across the surface of the planet Jupiter.

* The 4 major satellites of Jupiter, visible in revolution about the planet, with the satellite positions changing each night.

* Saturn and its famous ring system, as well as several satellites of Saturn, much fainter than the major satellites of Jupiter.

* The Moon: A veritable treasury of craters, mountain ranges, and fault lines.

* Deep-Space: Nebulae, galaxies, multiple star systems, star clusters -- hundreds of such objects are visible through the Meade MTS telescopes.

* Terrestrial Objects: Your Meade telescope may also be used for the observation of land subjects. In this case, note that the image orientation will not be correct. Terrestrial observations should almost always be made using a low-power eyepiece for bright, sharp images; such as the standard MA 25mm eyepiece. Land objects viewed at higher powers will not generally yield the same brightness and sharpness as the images are distorted by the thickest part of the atmosphere close to Earth.

d. Calculating Power

The power, or magnification, at which a telescope is operating is determined by 2 factors: the focal length of the objective lens, and the focal length of the eyepiece. The focal length of the MTS-SN6 is 762mm and MTS-SN8 is 813mm. To compute power, divide the focal length of the eyepiece into the focal length of the objective lens; the resulting quotient is the magnifying power of the telescope, used with the eyepiece in question. For example, the standard MA 25mm eyepiece when used in the MTS-SN8 yields a power of:

$$\textbf{Power} = \frac{\textbf{813mm}}{\textbf{25mm}} = \textbf{33X}$$

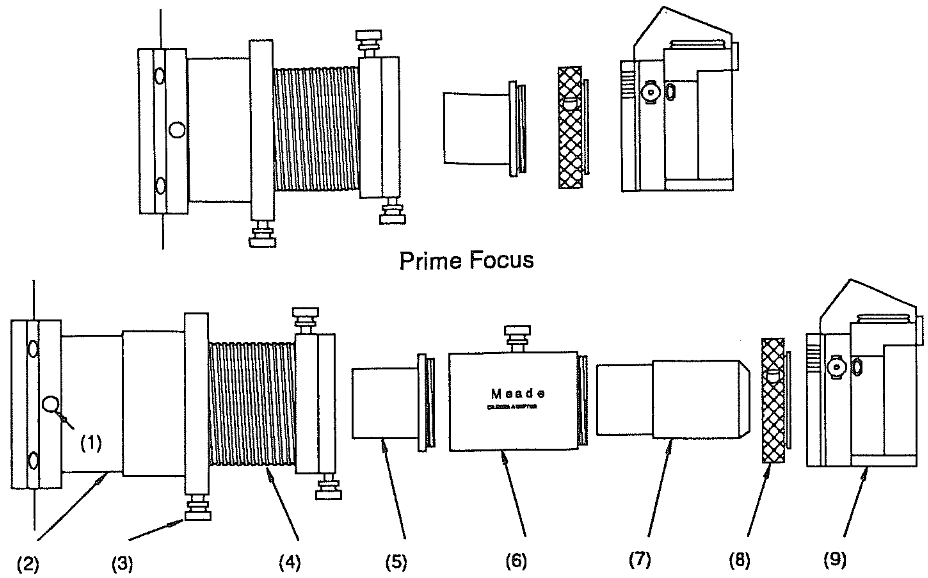
e. Seeing Conditions

Even in normal city conditions, with all of the related air and light pollution, there are many interesting celestial objects to observe. But, to be sure, there is no substitute for the clear, dark, steady skies generally found outside from urban environments, or on mountaintops. Objects previously viewed only in the city take on added detail or are seen in wider extension, or even become visible at all for the first time.

The amateur astronomer is faced typically with two broadly defined problems when viewing astronomical objects through the Earth's atmosphere: first is the clarity, or *transparency*, of the air, and second the *steadiness* of the air. This latter characteristic is often referred to as the quality of "seeing." Amateur astronomers talk almost constantly about the "seeing condition," since, perhaps ironically, even the clearest, darkest skies may be almost worthless for serious observations if the air is not steady. This steadiness of atmosphere is most readily gauged by observing the "twinkling" of the stars: rapid twinkling implies air motion in the Earth's atmosphere, and under these conditions, resolution of fine detail (on the surface of Jupiter, for instance) will generally be limited. When the air is steady, stars appear to the naked eye as untwinkling points of unchanging brightness. It is in such a situation that the full potential of the telescope may be realized: higher powers may be used to advantage, closer double stars resolved as distinct points, and fine detail observed on the Moon and planets.

f. Astrophotography

Your reflecting telescope can be used as a powerful astrophotographic lens with the addition of virtually any 35mm Single Lens Reflex (SLR) camera body. The Basic Camera Adapter and T-mount for your specific brand of SLR camera serve as the link between telescope and camera.



Eyepiece Projection

Fig. 2

(1) Focuser slide lock thumbscrew
(2) Focuser slide tube
(3) Focus lock thumbscrew
(4) Focuser threaded tube
(5) Prime focus adapter
(6) Eyepiece projection body
(7) Eyepiece
(8) T-Mount
(9) Camera body

Prime Focus Astrophotography

Refer to the top half of Fig. 2 (Prime Focus) for the correct positioning of the pieces described below.

1. Remove the standard lens from your camera and set it aside. (Remember: the telescope is now the camera's lens.)

2. Attach the optional T-mount (#8, Fig. 2) to your 35mm SLR camera body.

3. Thread the Prime focus adapter (#5, Fig. 2) only into the front of the T-mount now attached to your camera.

4. Remove the eyepiece from the focuser and insert the chrome barrel of the Prime focus adapter into the focuser and lock into position by tightening the thumbscrew.

5. Loosen the Focuser slide lock thumbscrew (#1, Fig. 2) and lower the focuser slide tube to the lowest position. Retighten the thumbscrew.

6. Focus the camera by looking through its viewfinder and rotating the focuser threaded tube (#4, Fig. 2) until the image is sharp. Once focused, this position can be locked by tightening the focus lock thumbscrew (#3, Fig. 2).

In the above configuration, the telescope is operating in the "prime-focus" or no-eyepiece photographic mode. The resulting magnification is 15X for the MTS-SN6 and 16X for the MTS-SN8. In the prime focus mode, the focuser slide tube must be moved to the lowest position in order to reach focus. The low magnification yielded in this mode is ideal for wide-angle photography of the Moon, galaxies, nebulae, and star clusters.

Eyepiece Projection Astrophotography

Refer to the lower half of Fig. 2 for correct positioning of the parts described below.

When higher magnification is required, an eyepiece may be inserted into the Basic Camera Adapter - in order that the image is projected through the eyepiece, onto the film plane. This is known as Eyepiece-Projection photography, and is the best way to obtain enlarged images of the planets.

1. Insert the eyepiece (#7, Fig. 2) into the eyepiece projection body (#6, Fig. 2) and lock in place by a gentle tightening of the thumbscrew.

2. Thread the eyepiece projection body (with the eyepiece inside) between parts (5) and (8) as shown in Fig.2.

3. Raise the focuser slide tube to the original (extended) position.

4. Focus the camera by looking through its viewfinder and rotating the focuser threaded tube (#4, Fig. 2) until the image is sharp. Once focused, this position can be locked by tightening the focus lock thumbscrew (#3, Fig. 2).

Note: For increased projection magnification, one or more extension tubes may be attached between parts (6) and (8) during eyepiece projection photography. Extension tubes may also be required with eyepieces of long mechanical length. Consult the Meade catalog for extension tubes available.

Distant deep space objects - such as nebulae and galaxies - present a unique challenge to the astrophotographer: the targets are faint (often requiring exposure times of up to an hour) and, of course, they are constantly moving around the celestial sphere. With the telescope's motor drive engaged, the camera can be kept pointing to the same place in the sky for extended periods of time. However, tracking errors may still result. These minor variations in the driving rate stem from several sources including: inaccurate Polar alignment; differential refraction of light through the Earth's atmosphere; variations in local frequency (not a factor with the Model #790 Quartz Electronic Motor Drive); and mechanical tolerances in the manufacture of the drive system.

Because every tracking flaw will be faithfully recorded on the film, the astrophotographer must monitor the driving rate and make careful corrections to compensate for these tracking errors. Several Meade drive correctors are available to actuate these corrections.

G. MAINTENANCE

1. Cleaning the Optics

As with any quality optical instrument, lens surfaces should be cleaned as infrequently as possible. Perhaps the most common telescope maintenance error is cleaning the optics TOO OFTEN. A little dust on the correcting plate causes negligible degradation of optical performance. Do not clean the outside surface of this lens unless really necessary. To remove small particles on the corrector lens surface, use a camel's hair brush (gently!) or blow off with an ear syringe (available from a local pharmacy). If further cleaning is required, a photographic lens cleaner may be used. In any case DO NOT clean the correcting plate by taking strong circular wipes with a piece of cloth or other material. Use a white facial tissue and make short, gentle, radial wipes (from the center outward). Change tissues several times when cleaning the entire plate.

If grease or other organic materials (e.g. fingerprints) are in evidence on the outer surfaces of the corrector lens, the following homemade cleansing solution works well: 2 parts distilled water, 1 part isopropyl alcohol, and 1 drop of biodegradable liquid dishwashing detergent per pint of solution. Use only a small amount of solution, and take gentle, radial wipes, changing tissues several times to clean the corrector lens.

The above solution may also be used to clean correctoring plates with the special Multi-Coated Optics Group (MCOG). IF YOUR OPTICS ARE SO COATED, TAKE SPECIAL CARE IN CLEANING TO AVOID SCRATCHES.

Replace the dust cap when the telescope is not in use. This dust cap also serves the important purpose of keeping dust and other contaminants off the surfaces of the corrector lens.

WARNING: Do not in any case remove the correcting plate from its machined housing for cleaning or other purposes. You will almost certainly not be able to replace the corrector in its proper rotational orientation, and serious degradation of optical performance may result.

2. Alignment (Collimation) of the Optical System

The optical collimation of any astronomical telescope used for serious purposes is important. Take special care to read and understand this section well, in order that your telescope will perform fully to its capabilities.

All Meade Schmidt-Newtonians are precisely collimated at the factory before packing and shipment, and it is probable that you will not need to make any optical adjustments before making observations. However, if the telescope sustained rough handling in shipment, you may need to re-collimate the optical system. Such re-collimation is not a difficult procedure in any case.

The collimation procedure for the Meade Schmidt-Newtonians is slightly different from that of other Newtonian reflecting telescopes, because of the "fast" f/4 to f/4.5 focal ratio of the primary mirror. In typical Newtonian reflectors with more conventional focal ratios (i.e. longer focal ratios), when the observer looks down the focuser tube (without an eyepiece in the focuser), the images of the diagonal mirror, primary mirror, focuser tube, and the observer's eye appear *centered* relative to each other. However, with the short focal ratio primary mirror of the Schmidt-Newtonian, correct collimation requires that the diagonal mirror be offset in 2 directions: (1) away from the focuser and (2) towards the primary mirror, in equal amounts. This offset is approximately 1/8" in each direction. <u>Note that these offsets have been performed at the factory prior to shipment of your telescope.</u> It is only necessary for you to confirm below that the telescope has not been badly jarred out of collimation, and to perform the final fine-tuning of Step 4, below.

Fig. 3 shows a correctly collimated Schmidt-Newtonian telescope, as it appears when viewed through the focuser with the eyepiece removed. To check and, *if necessary*, set the optical collimation, follow these steps:

1. Observe through the focuser, without an eyepiece, and with your body oriented so that the telescope's primary mirror is to your left, and the correcting plate end of the telescope tube is to your right. The diagonal mirror (circle 2, Fig. 3) will appear slightly offset to the left, as shown in Fig. 3. The amount of "left" offset is set at the factor and is not adjustable. If the diagonal appears too high or too low, then adjust the 3 collimation screws on the plastic diagonal mirror housing.

2. If the reflection of the main mirror (circle 3, Fig. 3) is not centered on the surface of the diagonal mirror, adjust the 3 collimation screws on the plastic diagonal mirror housing to correct in the left or right direction, and rotate the diagonal mirror housing to correct in the up-down direction.

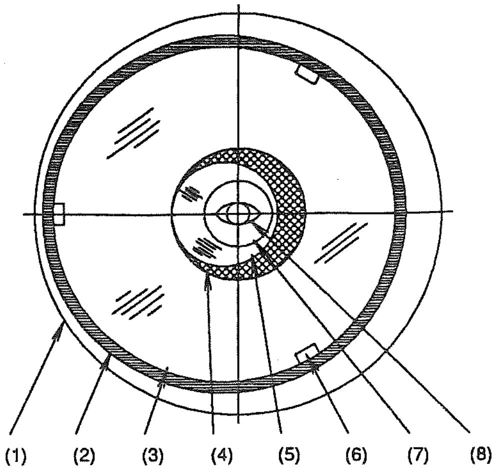


Fig. 3

(1) Focuser drawtube
(2) Diagonal mirror
(3) Reflection of primary mirror
(4) Reflection of plastic collimation housing
(5) Reflection of diagonal mirror
(6) Primary mirror clips
(7) Reflection of focuser drawtube
(8) Observers eye

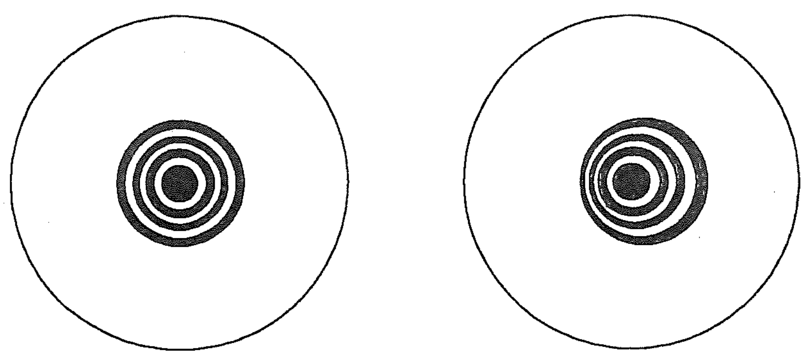
As described above, the 3 collimation screws on the plastic diagonal mirror housing are used for two different adjustments during the collimation procedure. Of these three screws, one is located closer to the focuser side of the tube, and the other two are located nearer the opposite side. The one screw closest to the focuser is used in step 2 above, and the other two are used in step 1. Note: all three screws must be adjusted together. You must loosen one in order to tighten another, and when finished, all three must be snug in order to hold the diagonal mirror in place.

DO NOT FORCE THE 3 COLLIMATION SCREWS PAST THEIR NORMAL TRAVEL, AND DO NOT ROTATE ANY SCREW OR SCREWS MORE THAN 2 FULL TURNS IN A COUNTERCLOCKWISE DIRECTION (i.e. NOT MORE THAN 2 FULL TURNS IN THE "LOOSENING" DIRECTION), OR ELSE THE DIAGONAL MIRROR MAY BECOME LOOSENED FROM ITS SUPPORT. NOTE THAT THE DIAGONAL MIRROR COLLIMATION ADJUSTMENTS ARE VERY SENSITIVE: GENERALLY, TURNING A COLLIMATION SCREW 1/2-TURN WILL HAVE DRAMATIC EFFECTS ON COLLIMATION.

3. If the reflection of the plastic collimation housing (with the reflection of your eye) is not centered within the reflection of the primary mirror, adjust the 3 collimation screws located on the rear of the primary mirror cell.

Note: there are 3 pairs of screws on the primary mirror cell. The 3 raised screws are the collimation screws, and the 3 screws that are flush to the housing are locking screws. These 3 pairs work together in a "push-pull" fashion, and the locking screws must be loosened slightly in order to adjust the collimation screws.

Proceed by "trial and error" until you develop a feel for which collimation screw to turn in order to change the image in any given way.



(1) (2)

Fig. 4

4. Perform an actual star test to confirm the accuracy of steps 1 through 3. Using the MA 25mm eyepiece, point the telescope at a moderately bright (second or third magnitude) star, and center the image in the main telescope's field of view.

5. Bring the star's image slowly in and out of focus until you see several disks surrounding the star's center. If step 4 was done correctly, you will see concentric (centered with respect to each other) circles (#1, Fig. 4). An

improperly collimated instrument will reveal oblong or elongated circles (#2, Fig. 4). Adjust the 6 push-pull collimation screws on the primary mirror housing until the circles are concentric on either side of focus.

In summary, the three adjustment screws on the plastic collimation housing change the tilt of the diagonal mirror so that it is correctly centered in the focuser drawtube and so that the primary mirror appears centered when looking into the focuser. The six push-pull screws on the primary mirror change the tilt of the primary mirror so that it reflects the light directly up the center of the tube to the diagonal.

3. Dewing of the Correcting Plate

Because of the correcting plate's proximity to the open air, it is possible in moist climates that dew may form on the outer surface of the glass during observations. One simple remedy for this dewing is to use a portable hair blow-drier; just a few "light" swipes of the warm air will clear the dew for a period of time.

If the above approach is not satisfactory, the correcting plate's outer surface may be hand cleaned. BUT BE CAREFUL! The correcting plate should be completely free of dirt and abrasive particles before wiping the glass. Use only a clean, white Kleenex tissue, and wipe radially outward from the center of the lens to the edge. Change Kleenexes often. Avoid using circular motions when wiping, and apply only the minimum pressure required to do the job. Hard wiping of the correcting plate will introduce fine scratches into the glass.

If you find that dew has formed on the correcting plate after bringing the telescope indoors from an observing session, allow the warm indoor air to dissipate the dew. Do not wipe off the dew in this instance, as it will evaporate naturally.

H. OPTIONAL ACCESSORIES

1. Viewfinders

Occasionally, objects may be hard to find, particularly at high powers, through the telescope. Therefore, a "viewfinder", which is basically a very low-power, wide-field telescope, is used to help "aim" the larger, main telescope. The Meade Schmidt-Newtonian telescopes are predrilled to accept either the Model 637 6x30 viewfinder or the Model 545 8x50 viewfinder.

Attaching the Viewfinder

To attach the viewfinder, remove the two cover screws located next to the focuser. Using the two screws supplied with the viewfinder, attach the viewfinder to the main tube. Tighten the screws to a firm feel, but do not over-tighten, which may cause the threads to strip.

Collimating the Viewfinder

The viewfinder will require alignment, or collimation, to the main telescope. Using the 25mm eyepiece, point the main telescope at some easy-to-find land object at least 200 yards distant. Center a well-defined object in the main telescope. Then, using the 6 collimation screws on the viewfinder bracket, adjust the viewfinder so that the crosshairs of the viewfinder are precisely centered on the object already centered in the main telescope. With this collimation accomplished, objects located first in the wide-field viewfinder will then be centered in the main telescope's field of view.

2. Setting Circles

Setting circles are printed dials which permit the location of faint celestial objects not easily found by direct visual observation.

Attaching the Setting Circles

In order to attach the larger R.A. setting circle, the mount must be partially disassembled. Note: the following instructions assume that a clock drive has not been added to the mount. If a clock drive is already installed, it will need to be removed before proceeding.

To install the R.A. setting circle, follow these steps:

1. Remove the three bolts which hold the pier cap to the pier, and place the telescope (without the pier and tripod legs) flat on some soft surface like a carpeted floor.

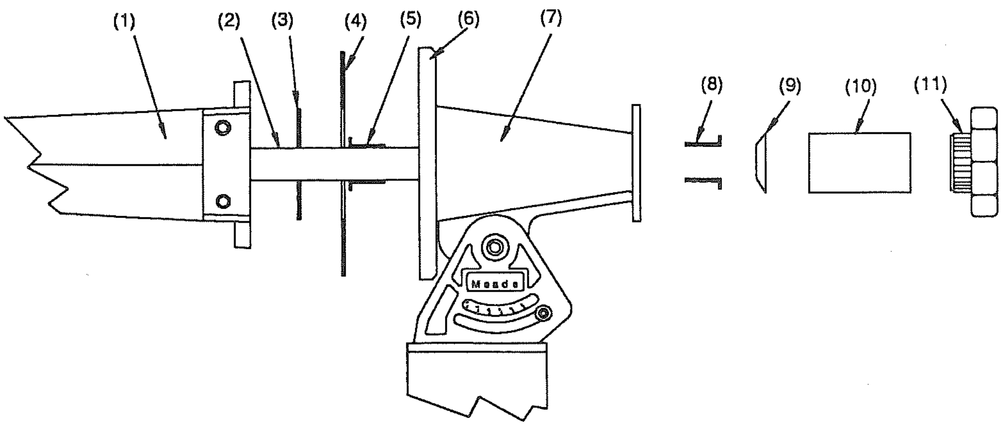


Fig. 5

(1) Fork arm
(2) Polar shaft
(3) Teflon thrust washer
(4) R.A. setting circle
(5) Front nyliner
(6) R.A. setting circle housing
(7) Polar housing
(8) Rear nyliner
(9) Spring washer
(10) R.A. drive spacer
(11) R.A. lock knob

2. Remove the R.A. lock knob (#11, Fig. 5) and slide off the R.A. drive spacer (#10, Fig. 5) and Spring washer (#9, Fig. 5).

3. The cone shaped polar housing (#7, Fig. 5) can now be removed from the rest of the telescope by sliding it off the polar shaft (#2, Fig. 5).

4. Position the R.A. setting circle onto the machined step in the R.A. setting circle housing (#6, Fig. 5).

5. Slide the polar housing back onto the polar shaft. Refer to Fig. 5 for the correct positioning of all parts.

6. Replace the Spring washer, R.A. drive spacer, and R.A. lock knob. (Be careful to put the correct side of the spring washer on first.)

7. Position the square setting circle pointer into the recess shown at #22 in Fig. 1.

Follow these steps to attach the Dec. setting circles:

1. Remove the Dec. lock knob (#1, Fig. 6).

2. Remove the Dec. clutch plate (#2, Fig. 6) from the two locating pins.

3. Position the Dec. setting circle onto the two locating pins.

4. Replace the Dec. clutch plate and Dec. lock knob.

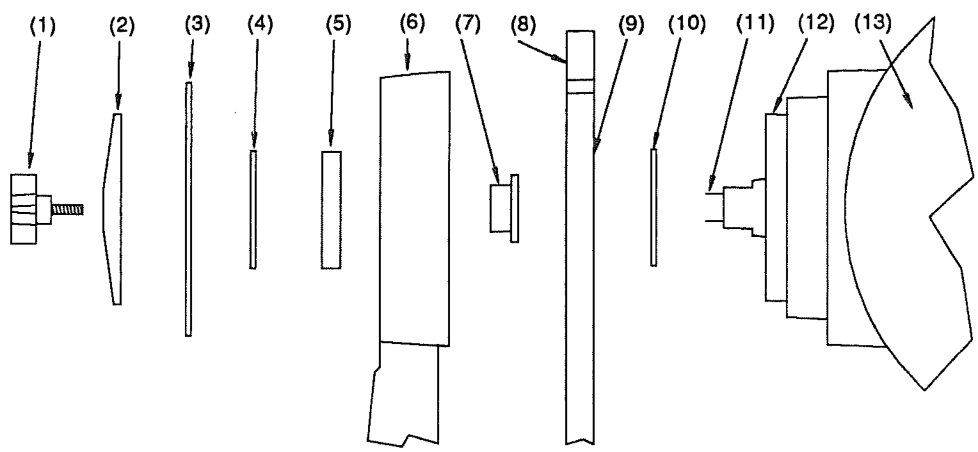


Fig. 6

(1) Dec. lock knob
(2) Dec. clutch plate
(3) Dec. setting circle
(4) Teflon washer
(5) Spacer (only on MTS-SN8)
(6) Fork arm
(7) Nyliner
(8) Tangent arm lock (only with Man. Dec.)
(9) Tangent arm (only with Man. Dec.)
(10) Teflon washer (only on MTS-SN6)
(11) Two locating pins
(12) Tube adapter
(13) Optical tube assembly

5. Position the curved Dec. setting circle pointer into the recess in the fork arm (#23, Fig. 1)

6. Repeat steps 1 - 5 for the other fork arm.

Using the Setting Circles

To use the setting circles, follow this procedure:

1. Using a star chart or star atlas, look up the celestial coordinates (Right Ascension and Declination) of an easy-to-find object, such as a bright star.

2. With the telescope aligned to the Pole, center the object in the telescope's field of view.

3. Manually turn the R.A. setting circle to read the R.A. of the object now in the telescopic field.

4. To locate a faint object using the setting circles, determine the object's celestial coordinates from a star atlas, and move the telescope in R.A. and Dec. until the setting circles read the R.A. and Dec. of the object you are attempting to locate.

5. Note that the R.A. setting circle must be re-positioned to the R.A. of a known object EACH TIME the setting circles are used, which may be several times in one observing session.

3. #788 Electric Motor Drive System

The Model #788 Electric Drive attaches directly to any MTS Series telescope and permits fully automatic tracking of astronomical objects. This motor drive was completely assembled on a telescope and most adjustments were made at the factory. The only tool you need to furnish is a small screwdriver. Attachment to your telescope is simple and straight-forward.

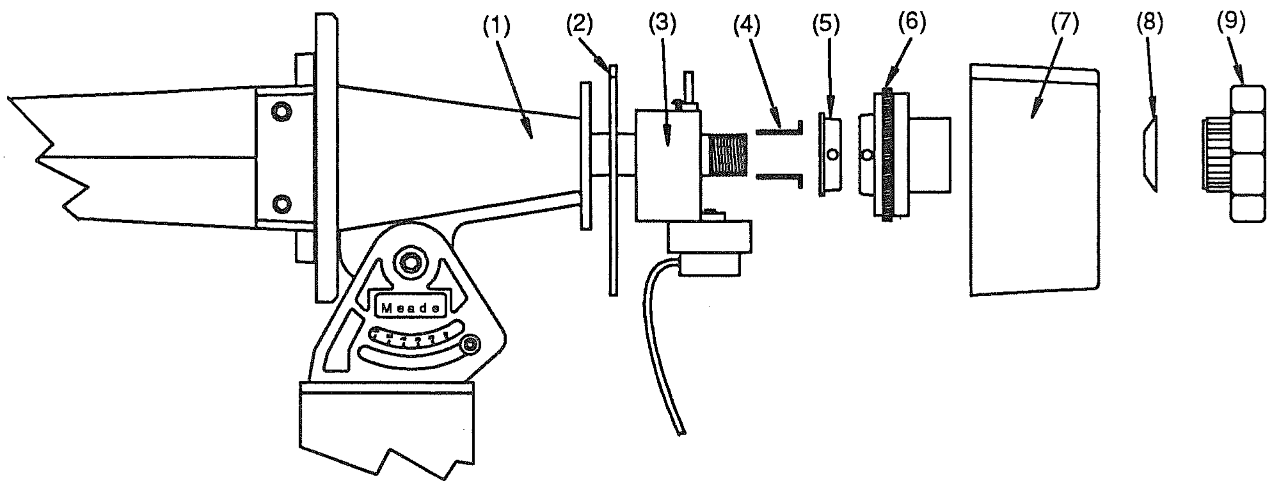


Fig. 7

(1) Polar housing
(2) Back plate
(3) Motor and worm block assembly
(4) Nyliner
(5) Set Collar
(6) Clutch system
(7) Clock cover
(8) Spring washer
(9) R.A. lock knob

Installation of Motor Drive

1. Unthread and remove the R.A. lock knob (#9, Fig. 7) and slide the R.A. drive spacer and Spring washer off the polar shaft.

2. Remove the rear nyliner (#4, Fig. 7).

3. Attach the back plate (#2, Fig. 7) to the lower end of the polar housing using the three 10-24 socket cap screws and #10 flat washer supplied. The back plate is shipped with the motor and worm block assembly (#3, Fig. 7) attached, and these should be left on. Firmly tighten the attachment screws.

4. Replace the nyliner that was removed in step 2. Be sure the nyliner goes completely into the polar housing, and the flange of the nyliner fits up against the back plate.

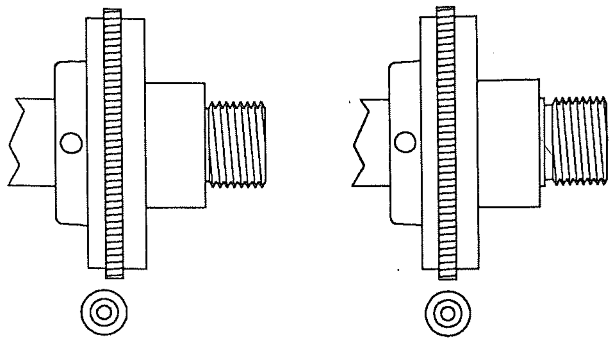
5. Position the supplied set collar (#5, Fig. 7) onto the polar shaft.

6. Position the set collar so that the polar shaft cannot move up or down the polar housing, but still rotates freely. Lock set collar firmly in place.

7. Slide the clutch system (#6, Fig. 7) carefully onto the polar shaft. This part is machined to very close tolerances and should be a tight fit. Because of size variations in the polar shaft diameter, it may require a bit of pressure to get the clutch system to slide on the polar shaft. If the clutch system is too tight to slide, fine sandpaper may be used to sand the inside of the clutch hub. Remove just enough material so that the clutch system will slide on.

8. Loosen the two worm block attachment screws which are located on the opposite side of the back plate. Move the worm block down as far as it will go and re-tighten the screws.

9. Move the clutch system over the worm block until the center of the worm gear is centered over the clutch system and fasten in place by incrementally tightening the three set screws. Refer to Fig. 8 for proper clutch system/worm block positioning.



INCORRECT CORRECT

Note: Worm block not shown for clarity

Fig. 8

10. Remove the motor from the worm block (secured by two screws).

11. Attach the worm adjustment knob to the end of the worm shaft which protrudes above the worm bushing.

12. Loosen the worm block attachment screws and move the worm block up until the worm and worm gear are engaged. A little play must be left between the worm and worm gear to avoid binding. Too much play, however, will cause "backlash" in right ascension, so the amount of play should be kept to a minimum. When the worm block is properly set, re-tighten the attachment screws firmly.

13. Rotate the worm by turning the worm adjustment knob. The worm should turn freely without binding. If binding occurs, return to step 12.

14. When the worm block is properly positioned, remove the worm adjustment knob and reinstall the motor. The nuts attaching the motor should be only finger tight.

15. Apply grease (or Vaseline) to all exposed gears.

16. Attach the motor cover to the back plate using the five screws, taking care not to pinch the motor wires between the back plate and motor cover.

17. Replace the Spring washer and R.A. lock knob. Tighten the R.A. lock knob gently, to a light pressure.

Installation of the motor drive is now complete.

Troubleshooting the Motor Drive System

When the electric motor drive is plugged into a standard A.C. outlet, the telescope should accurately track celestial objects. Remember, this tracking rate is visible only through the telescope; you will not actually "see" the telescope moving, since the celestial rate is very slow. (The hour hand on a clock moves twice the speed that the telescope will move!)

If the motor drive is not working, remove the motor cover and see if the worm is turning (this worm turns one revolution every ten minutes. Put a pencil mark on the worm and check its position after five minutes). If the worm is turning, then the problem is one of the following:

(1) The telescope is not properly balanced. This should not be a problem with the standard telescope, but if you have added a camera or large viewfinder, an optional balance weight system may be needed. See below for information on the #1401 and #1402 Balance Weight Systems.

(2) The clutch of the drive system needs to be tightened by tightening the R.A. lock knob.

If the worm is not turning, then the problem is one of the following:

(1) The motor is not getting power - check the plug connection.

(2) The worm block is out of adjustment, and the worm is binding.

In this case, maladjustment of the worm block, the worm gear and worm are too close together and are binding. Repeat steps 10 - 15, above.

Because the main drive motor is a synchronous motor, it can only drive at the correct rate, never too fast or too slow. If the telescope is drifting in R.A., it is almost always due to improper balancing. If the telescope drifts in declination, the equatorial mount is not correctly aligned with the Pole. In either case, see the appropriate information above.

4. #790 LX3 Quartz Electronic Drive System

The #790 Quartz Electronic Motor Drive System incorporates the superb Meade LX Drive System and the latest in state-of-the-art electronics to achieve both Quartz accuracy and true sidereal rate tracking. The quartz crystal used in the Meade #790 Quartz Motor Drive System provides accurate tracking to within plus or minus .005% of the sidereal frequency, independent of temperature changes or local power line variations.

The Model #790 Quartz Electronic Motor Drive System attaches directly to any MTS Series telescope and permits fully automatic tracking of astronomical objects. This motor drive was completely assembled on a telescope and most adjustments were made at the factory. The only tool you need to furnish is a small screwdriver. Attachment to your telescope is simple and straight-forward.

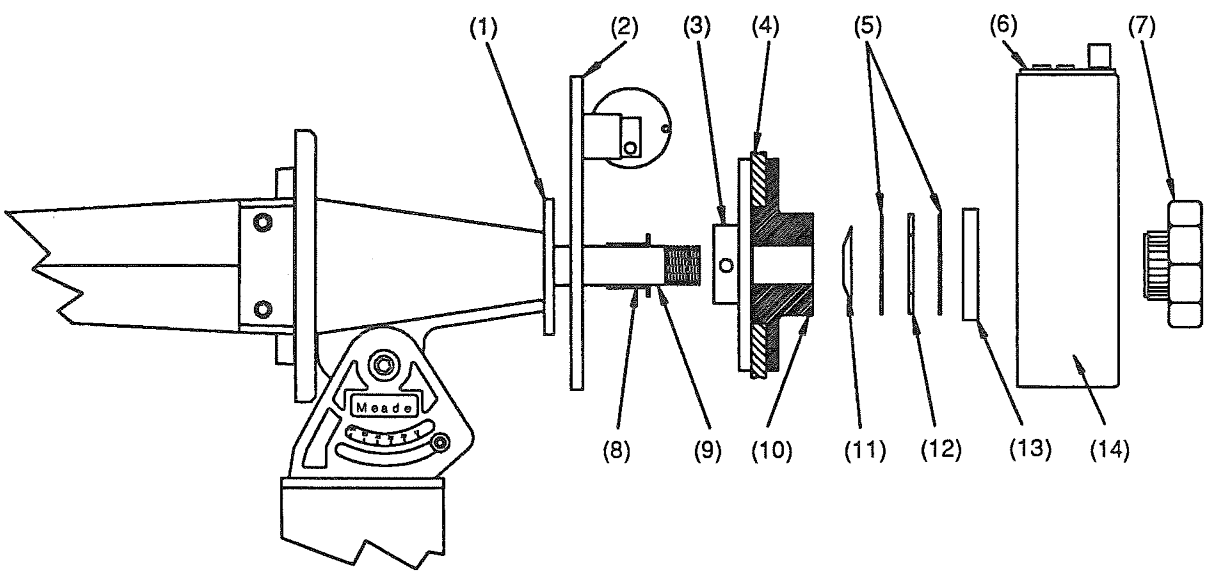


Fig. 9

(1) Polar housing
(2) Back plate
(3) Clutch hub
(4) Worm gear
(5) Bearing race
(6) Power panel
(7) R.A. lock knob

(8) Nyliner
(9) Polar shaft
(10) Pressure plate
(11) Spring washer (2)
(12) Thrust bearing
(13) Bearing housing
(14) Clock cover

Installation of Motor Drive

1. Unthread and remove the R.A. lock knob (#7, Fig. 9) and slide the R.A. drive spacer (the black metal tube behind the R.A. lock knob) off the polar shaft.

2. Remove the rear nyliner (#8, Fig. 9).

3. Attach the back plate (#2, Fig. 9) to the lower end of the polar housing using the three 10-24 socket cap screws and #10 flat washers supplied. The back plate is shipped with the motor and worm block assembly attached, and these should be removed. Firmly tighten the attachment screws.

4. Replace the nyliner that was removed in step 2. Be sure the nyliner goes completely into the polar housing, and the flange of the nyliner fits up against the back plate.

5. Position the Clutch system onto the polar shaft. (The Clutch system consists of three parts: the clutch hub (#3, Fig. 9), the Worm gear (#4, Fig. 9), and the Pressure plate (#10, Fig. 9).) This part is machined to very close tolerances and should be a tight fit. Because of size variations in the polar shaft diameter, it may require a bit of pressure to get the clutch system to slide on the polar shaft. If the clutch system is too tight to slide, fine sandpaper may be used to sand the inside of the clutch hub. Remove just enough material so that the clutch system will slide on.

6. Position the Clutch hub up against the nyliner so that the polar shaft cannot move up or down the polar housing, but still rotates freely. Lock the Clutch hub firmly in place by tightening the three set screws.

7. Replace the worm block and motor system. Tighten the two shoulder bolts firmly, but do not overtighten. The worm block should pivot freely on the one shoulder bolt. Connect the two wires from the motor to the two-wire connector from the transformer (#2, Fig. 10). It does not matter which way the wires connect together.

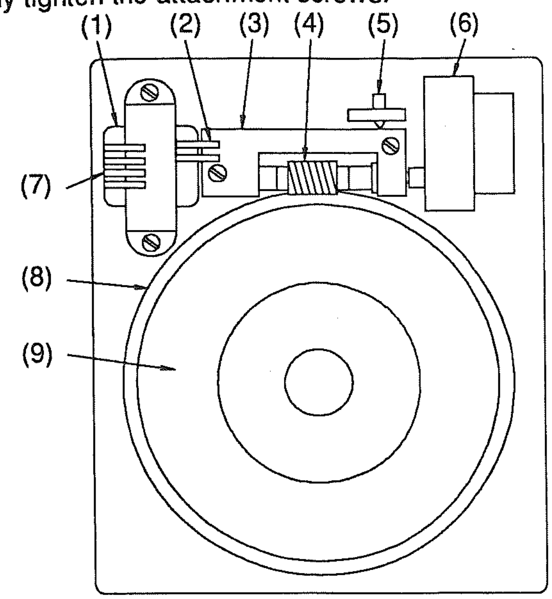


Fig. 10

(1) Transformer
(2) Motor connector
(3) Worm block
(4) Worm
(5) Spring plunger
(6) Motor
(7) Power panel connector
(8) Worm gear
(9) Pressure plate

8. The Spring plunger (#5, Fig. 10) is used to spring load the worm block. Move the worm block so that it engages the worm gear. Slowly tighten the Spring plunger so that it just touches the worm block. Continue tightening 1/4 turn more. This setting will provide the proper pressure to prevent any gear backlash, and still allow for variations in the worm gear.

9. Remove the four screws holding the Power panel (#7, Fig. 9) to the Clock cover (#7, Fig. 9). Let the power panel hang from the wires.

10. Place the Clock cover onto the clock drive, making sure not to "pinch" any wires between the two parts.

11. Reach through the "window" in the Clock cover (where the Power panel was) and connect the three-wire connector from the transformer (#7, Fig. 10) onto the circuit board located inside the clock cover. This connector will only go one way.

12. Replace the Power panel with the four screws.

13. Slide the spring washer (#11, Fig. 9) onto the polar shaft with the larger side toward the pressure plate.

14. Slide the Bearing races (#5, Fig. 9), Thrust bearing (#12, Fig. 9), and Bearing housing (#13, Fig. 9) onto the polar shaft.

13. Replace the R.A. lock knob and tighten gently, to a light pressure.

Installation of the Motor drive is now complete.

AC Operation

The #790 Motor Drive is supplied with a 12v DC converter for AC operation. This converter is for indoor use only! The converter has a 25 foot cord, which should reach most observing locations from an indoor plug. If the cord is too short to reach the telescope's location, optional extension cords in 25 foot lengths are available from your Meade dealer. Do not plug the converter into the end of a standard extension cord to extend the observing range of the telescope.

To use the converter, plug it into a standard indoor receptacle. Plug the end of the cord into the power input socket (#3, Fig. 11). Check that the Internal/ External switch (#5, Fig.11) is on the "internal" position. The power indicator (#2, Fig. 11) should now be lit and the telescope tracking. If the Power Light is not working, see "Trouble Shooting the Drive System" below.

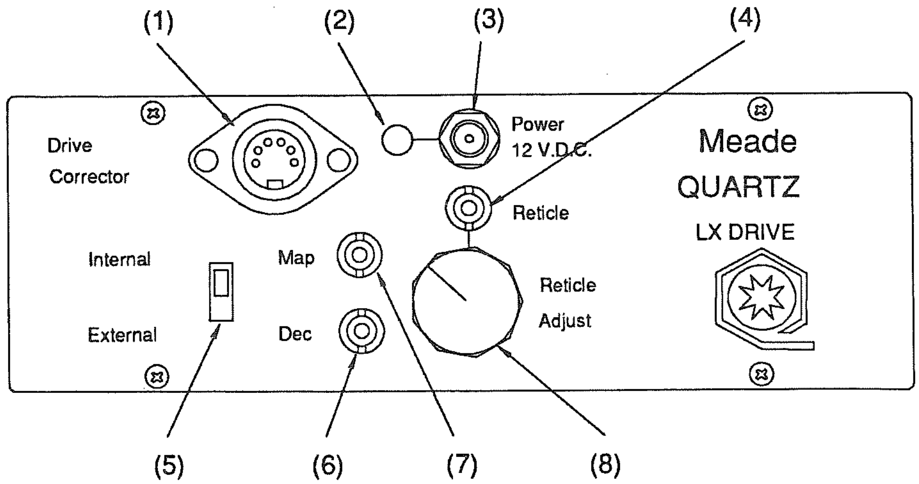


Fig. 11

(1) Drive corrector socket
(2) Power indicator
(3) Power input socket
(4) Illuminated Reticle Socket
(5) Internal/External Switch
(6) Dec motor output
(7) Map light output
(8) Illuminated Reticle Adjust Knob

DC Operation

The #790 Motor Drive will operate on DC current and may be powered directly from a 12 volt battery or power cell. The #790 Motor Drive normally draws about .35 amp in standard operation. Maximum current usage is .55 amp when all optional accessories are being used. The Meade Power Cell is a 5 amp/hour power cell, and will operate from 8 to 12 hours depending on usage. If the telescope is being powered from a car battery, the current drain is negligible. The telescope may be used all night without fear of a "dead battery".

The #790 Motor Drive is supplied with a DC power cable. Connect the cigarette plug to your cigarette lighter, and the other end of the cable into the power socket (#3, Fig.11) on the power panel of the #790. If the power indicator is not lit, see "Trouble Shooting the Drive System" below.

Internal/External Switch

The Internal/External switch (#5, Fig. 11) is used to move from the standard drive mode to the remote drive corrector mode.

When the telescope is on internal, all frequency control is done internally by the quartz crystal. The Drive Corrector Handbox will not function even if plugged in.

To use the Drive Corrector Handbox, move the slide switch to the "external" position. Now, the frequency control is transferred to the drive corrector handbox. Note: If the slide switch is on "external" without a Drive Corrector Handbox being connected, the drive unit will not receive power. For detailed Drive Corrector Handbox instructions, see "Single/Dual-Axis Drive Corrector" below.

Output Jacks

The #790 Quartz Motor Drive System has several built-in features for simplifying the operation of the telescope. Output jacks are provided for some of the more common accessories, eliminating the need for separate battery packs.

Drive Corrector Socket

The Drive Corrector Socket (#1, Fig. 11) results in the "plug-in" capability of the #790. By simply plugging the Drive Corrector Handbox into the socket, you have a full-fledged single/dual-axis drive corrector without all the fuss of separate chassis boxes and power supplies.

Illuminated Reticle & Adjust Knob

The Illuminated Reticle can be plugged directly into the #790 power panel reticle jack (#4, Fig. 11), eliminating the need for the separate battery box. The Reticle Adjust Knob (#8, Fig. 11) controls the brightness of the reticle.

Map Light

The Meade Map Light plugs into this socket (#7, Fig. 11). It provides a constant-brightness red light on a 6 foot cord for reading a star atlas or taking observing notes.

Model 38M Declination Motor

The Declination Motor Jack (#6, Fig. 11) is used in the Dual-Axis Drive Corrector mode. The Drive Corrector Handbox is required for use of the declination motor. The declination motor does not function if the Drive Corrector Handbox is not connected and the Internal/External Switch (#5, Fig. 11) is not set to "External".

Single/Dual-Axis Drive Corrector

The Meade "plug-in" Drive Corrector Handbox for the The #790 Quartz Electronic Motor Drive System is designed to be used either as a single-axis (Right Ascension) drive corrector or dual-axis (Right Ascension and Declination) drive corrector. The dual-axis mode requires only the addition of the Model 38M Declination Motor; the "N" and "S" buttons on the Drive Corrector Handbox will not function unless the Model 38M Declination Motor is attached.

Operation

Quartz Mode

When the slide switch (#2, Fig. 12) is on the "Quartz" position, the Quartz crystal in the #790 Motor Drive is controlling the telescope's tracking speed. The "E" and "W" buttons override the Quartz crystal to speed up or slow down the tracking speed as long as the button is pressed. When the button is released, the Quartz crystal resumes control. Note: In the "Quartz" mode, the variable speed knob (#3, Fig. 12) is non-functional. This mode of operation is best suited for photographing deep-space objects that move at the sidereal rate.

Manual Mode

Moving the slide switch to the "Manual" position transfers the tracking speed control from the Quartz crystal to the variable speed knob. This knob will vary the drive frequency from 57 HZ to 62 HZ, which covers the Lunar, Solar, and Sidereal rates. The Lunar and Solar rate positions are marked for reference. As in the "Quartz" mode, the "E" and "W" buttons override the variable knob to speed up and slow down the drive rate.

Dual-Axis Mode

To use the Meade Drive Corrector Handbox in the dual-axis mode, simply plug in the optional Model 38M Declination Motor. The "N" and "S" buttons are automatically activated.

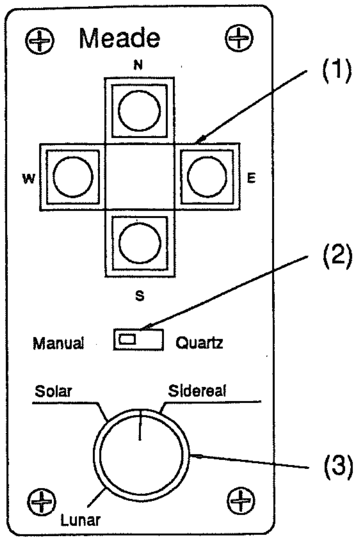


Fig. 12

(1)Control buttons
(2) Quartz/Manual slide switch
(3) Variable speed knob

Troubleshooting the #790 Motor Drive

The #790 Quartz Electronic Motor Drive System is thoroughly tested at the factory, and should not require any servicing. However, should the motor drive fail to operate, please follow these simple instructions.

1. Check to make sure that the Internal/External switch is properly set. If the Drive Corrector Handbox is not attached, the slide switch must be set to "Internal".

2. If the power indicator is not lit, check all electrical connections. Try the alternate power supply to determine if the problem is the telescope or the power source. If using the AC converter, use the DC power cable and car battery. If the power supply is the problem, return the power supply to your Meade dealer. If the telescope does not operate with either power supply and the power indicator does not light, then the motor drive may need servicing. Please contact your Meade dealer or our Customer Service Department.

3. If the power indicator is lit and the telescope fails to track, unplug the telescope from the power source. Remove the four screws holding the power panel. Make sure the all electrical wires are properly connected as described above.

5. #66A and #66C Manual Declination Control

The #66A (for the MTS-SN6) and #66C (for the MTS-SN8) Manual Declination Controls attach directly to the Meade MTS telescopes and allow precise manual adjustments in declination.

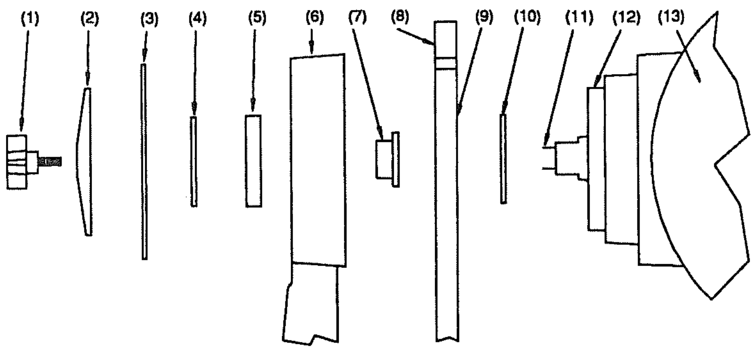


Fig. 13

(1) Dec. lock knob
(2) Dec. clutch plate
(3) Dec. setting circle
(4) Teflon washer
(5) Spacer (only on MTS-SN8)
(6) Fork arm
(7) Nyliner
(8) Tangent arm lock (only with Man. Dec.)
(9) Tangent arm (only with Man. Dec.)
(10) Teflon washer (only on MTS-SN6)
(11) Two locating pins
(12) Tube adapter
(13) Optical tube assembly

Attaching the Manual Declination Control

1. Remove the three bolts which hold the pier cap to the pier, and place the telescope (without the pier and tripod legs) flat on some soft surface like a carpeted floor.

2. Remove the Dec. lock knob (#1, Fig. 13), Dec. clutch plate (#2, Fig. 13), and Dec. setting circle (#3, Fig. 13) if installed, from the *left* fork arm. This is the fork arm that has a hole drilled in each side. The Teflon washer (#4, Fig. 13) and the spacer (#5, Fig. 13) (if on an MTS-SN8) should be discarded.

3. Using the supplied hex wrench, remove the two fork arm attachment bolts (#10, Fig. 1) on the *left* fork arm.

4. Completely remove the *left* fork arm and remove and discard the second teflon washer (#10, Fig.13) (if on an MTS-SN6). Remember, parts #4, #5, and #10 will not be used.

5. Lay the fork arm down flat on its front surface so that the round end is up. You will be looking at the inside of the fork arm.

6. Press the two bronze bushings into the fork arm. The bushing with the large hole (#3, Fig. 14) goes on the *left* side, and the bushing with the small hole (#8, Fig. 14) goes on the *right* side.

7. Starting from the left side of the fork arm, slide the Slow motion screw (#6, Fig. 14) through the bronze bushing with the large hole about one *half way* to the other side of the fork arm.

8. Slide the Spring washer with the large hole (#4, Fig. 14) onto the *right* side of the Slow motion screw. The Spring washer will slide over the threads. Be careful to position the Spring washer so that the larger side is toward the bronze bushing.

9. Slide the Set collar (#5, Fig. 14) onto the *right* side of the Slow motion screw. The Set collar will also slide over the threads.

10. Thread the Tangent arm nut onto the Slow motion screw.

11. Slide the Spring washer with the small hole (#7, Fig. 14) onto the right side of the Slow motion screw. This Spring washer will only slide up to the thread. Be careful to position the Spring washer so that the larger side is toward the bronze bushing.

12. Move the Slow motion screw further to the *right* until the small end goes through the Bonze bushing on the right. Notice that as you put pressure on the Slow motion screw (in the right direction) the Spring washer on the right will "give" slightly.

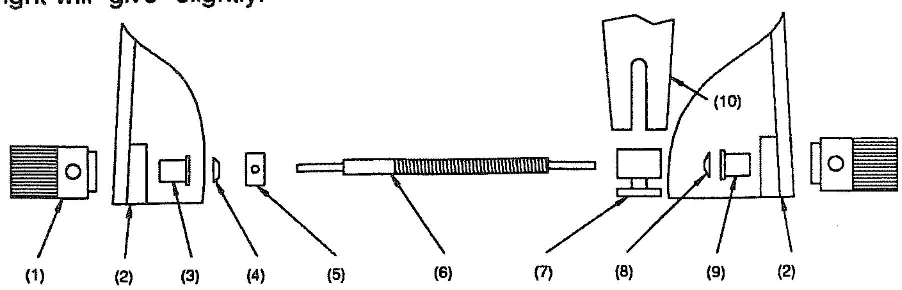


Fig. 14

(1) Manual Dec knob
(2) Fork arm
(3) Bronze bushing with large hole
(4) Spring washer with large hole
(5) Set collar
(6) Slow motion screw
(7) Tangent arm nut
(8) Spring washer with small hole
(9) Bronze bushing with small hole
(10) Bottom of Tangent arm

13. Move the Set collar to the *left* as far as possible while holding the Slow motion screw in place. As you push the set collar to the left, the Spring washer on the left will also "give" slightly.

14. Position the Set collar so that each Spring washer has a slight pressure on it, and lock the set collar in place. The Slow motion screw should rotate freely without any movement left or right. If the Slow motion screw will not rotate freely, then the Set collar is too far to the left. If the Slow motion screw has left and right play, then the Set collar is too far to the right.

15. Attach the two Manual Dec. knobs to the Slow motion screw.

16. Lay the Tangent arm into the Fork arm. Notice that the Manual Dec. lock fits through a slot in the top of the fork arm. Located on the side of the Tangent arm is a small nut for adjusting the Manual Dec. lock. This nut is reached through a second slot in the side of the fork arm. If this slot is on the wrong side to reach the adjustment nut, then turn the Tangent arm over.

17. Slide the bottom of the Tangent arm into the Tangent arm nut so that the Tangent arm is in front of the Slow motion screw.

18. Move the whole Fork arm assembly over to the telescope and loosely attach it to the telescope.

19. Position the top of the Tangent arm over the machined step on the Tube adapter. Make sure the Manual Dec. lock is loose.

20. Replace the Fork arm onto the Tube adapter and tighten the Fork arm attachment screws firmly.

21. Replace the washer, Setting circle (if applicable), Dec. clutch plate, and Dec. lock knob. The Dec. lock knob should only be gently tightened, the locking will now be done using the Manual Dec. lock.

22. The Manual Dec. lock has been adjusted at the factory, but continual use may cause this lock to loosen. To re-tighten the lock, first turn the Manual control knob so that the Tangent arm is about in the middle of its travel. Put the Manual Dec. lock lever in the "unlocked" position, and insert the appropriate hex wrench into the notched-out section of the Fork arm. Tighten the hex-head nut located just inside the notch. CAUTION: a little tightening of this nut goes a long way; generally only one turn of the nut is required to fully re-tighten the Manual Dec. lock.

6. #38M Electric Declination Control

The Model 38M Declination Motor Assembly attaches directly to the MTS Telescopes and allows precise adjustments in declination.

Note: attachment of the #38M Electric Declination Control requires that the #66A (for the MTS-SN6) or the #66C (for the MTS-SN8) Manual Declination Control already be attached to the telescope.

Attaching the Model 38M Declination Motor

1. Using the supplied hex wrench, remove the Declination slow-motion knob. This knob is on the opposite side of the fork arm, away from the Right Ascension controls.

2. Slide the large Teflon gear onto the shaft, small end first. Position the gear so that the metal hub does not quite touch the fork arm, (about 1/64" gap) and tighten the lock screw.

3. Using the two screws supplied, attach the Declination Motor to the undersurface of the fork arm. The small chrome pinion gear on the motor will clear the fork arm and engage with the Teflon slip-gear.

4. Plug the Declination cord into the motor. Plug the other end into the "Dec" socket on the #790 power panel.

The Declination slow-motion system is designed to be used manually without disengaging the motor. The Teflon gear will slip, allowing manual override. To use the manual slow-motion Declination control, simply turn the Declination slow-motion knob as if the motor were not attached.

The tension of the Teflon gear has been set at the factory. If it needs adjustment, turn the small slotted head set screw on the large hub of the Teflon gear. This adjustment is very sensitive and requires a very small turn. If this adjustment is set too light, the motor will turn the gear, but not the shaft. If it is set too tight, the manual slow-motion knob will become hard to turn.

Troubleshooting

If the electric Declination motor turns when pushing either of the red "North" or "South" buttons on the Drive Corrector Handbox, but does not move the telescope, check the following;

1. Make sure that the Declination tangent arm has not run out of travel. Look on the inside of the left fork arm at the bar running down the inside of the fork arm. If it is all the way to one side, then it must be moved back to the middle of the fork arm by turning the manual slow-motion knob.

2. Make sure the Declination lock is locked.

3. Check that the Teflon gear has sufficient tension.

Basic Specifications: MTS-SN6 and MTS-SN8

	MTS-SN6	MTS-SN8
Optical Design	Schmidt-Newtonian Catadioptric	Schmidt-Newtonian Catadioptric
Clear Aperture	152mm (6")	203mm (8")
Primary Mirror Diameter	152mm (6")	203mm (8")
Focal Length	762mm (30")	813mm (32")
Focal Ratio (photographic speed)	F/5	F/4
Resolution	0.75 arc secs.	0.56 arc secs.
Limiting Visual Magnitude (approx.)	13.4	13.9
Limiting Photographic Magnitude (approx.)	16.0	16.5
Image scale	1.91°/inch	1.79°/inch
Maximum Practical Visual Power	300x	400x
35mm Angular Film Coverage	1.81° x 2.67°	1.68° x 2.51°
Diagonal Mirror Size	1.83"	2.60"
Diagonal Mirror Obstruction	9.3%	10.6%
Minimum Focuser Height	2.25"	2.25"
Maximum Focuser Height	6.00"	6.00"
Telescope Mounting	Pier-type Equatorial Fork Mount	Pier-type Equatorial Fork Mount
Pier Size	4" Dia. x 24" long	4" Dia. x 24" long
Polar Shaft Diameter	1"	1"
Thrust Surface Diameter	3-3/8"	3-3/8"
Latitude Range	10° to 60°	10° to 60°
Net Telescope Weight (approx.)	33 lbs.	41 lbs.
Shipping Weight (approx.)	50 lbs.	60 lbs.

The following table lists the powers obtained and actual field of view for optional eyepieces.

Eyepiece/Apparent Field	MTS-SN6 Power/Actual Field	MTS-SN8 Power/Actual Field
Series 2 Modified Achromatic Eyepieces (3-elements; 1-1/4" O.D.)		
6mm/40°	127/0.31°	135/0.29°
9mm/40°	84/0.47°	90/0.44°
12mm/40°	63/0.63°	68/0.59°
25mm/40°	30/1.31°	32/1.23°
40mm/36°	N/A	N/A
40mmEWF/42°	N/A	N/A
Series 2 Orthoscopic Eyepieces (4-elements; 1-1/4" O.D.)		
4mm/45°	190/0.23°	203/0.22°
6mm/45°	127/0.35°	135/0.33°
9mm/45°	84/0.53°	90/0.49°
12.5mm/45°	61/0.73°	65/0.69°
18mm/45°	42/1.06°	45/0.99°
25mm/45°	30/1.47°	32/1.38°

Series 4000 Eyepieces

Eyepiece/Apparent Field	MTS-SN6 Power/Actual Field	MTS-SN8 Power/Actual Field
Super Plossl Eyepieces (5-elements; 1-1/4" O.D., except as noted)		
6.4mm/52°	119/0.43°	127/0.41°
9.7mm/52°	78/0.66°	84/0.62°
12.4mm/52°	61/0.84°	65/0.79°
15mm/52°	51/1.02°	54/0.96°
20mm/52°	38/1.36°	40/1.28°
26mm/52°	29/1.77°	31/1.66°
32mm/52°	24/2.18°	N/A
40mm/44°	N/A	N/A
56mm/52° (2" O.D.)	N/A	N/A
Super Wide Angle Eyepieces (6-elements; 1-1/4" O.D., except as noted)		
13.8mm/67°	55/1.21°	59/1.13°
18mm/67°	42/1.58°	45/1.48°
24.5mm/67°	31/2.15°	33/2.02°
32mm/67° (2" O.D.)	24/2.81°	N/A
40mm/67° (2" O.D.)	N/A	N/A
Ultra Wide Angle Eyepieces (8-elements; 1-1/4" O.D., except as noted)		
4.7mm/84°	162/0.51°	173/0.48°
6.7mm/84°	113/0.73°	121/0.69°
8.8mm/84° (1-1/4" - 2" O.D.)	86/0.97°	92/0.91°
14mm/84° (1-1/4" - 2" O.D.)	54/1.54°	58/1.44°